The French community Quantitative Precipitation Estimation (QPE) Re-analysis Project : Establishment of a reference multi-year, multi-source, nation-wide, hourly QPE data base for hydrology and climate change studies

L. Moulin, P. Tabary, J. Parent Du Chatelet, C. Gueguen, O. Lauratin, Jean-Michel Soubeyroux, Vazken Andréassian, C. Loumagne, H. Andrieu, G. Delrieu

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Moulin, L. (1,2), Tabary, P. (2), Parent du Châtelet, J. (2), Dupuy, P. (2), Gueguen, C. (2), Laurantin, O. (3), Soubeyroux, J.-M (4), Andréassian, V. (1), Loumagne, C. (1), Andrieu, H. (5) and Delrieu, G. (6)

(1) Cemagref, Hydrosystems and Bioprocesses Research Unit, Parc de Tourvoie, BP 44, 92163 Antony Cedex, France
(2) Radar Meteorology Center, Météo France
(3) Data Fusion Division, Météo France
(4) Direction of Climatology, Météo France
(5) Lab Cent Ponts & Chaussees, 44341 Bouguenais, France

(6) Laboratoire d'etude des Transferts en Hydrologie et Environnement, Grenoble, France

To the hydrologist, radar technology should provide both a mean to follow the spatial dynamics of rainfall fields and a quantitative evaluation of precipitation depths. Combined together, this information would provide spatially distributed rainfall depths that are potentially more informative than traditional ground rain gauge networks that only give point rainfall estimate. Over the last years, many studies have focused on the assessment of radar-based precipitation data for simulating stream flows through a hydrological model. However, the continuous and rapid evolution of radar technology has made the assessment of the operational value of radar rainfall estimates very difficult. Moreover, most studies have dealt only with a limited number of « selected » events on a limited number of « selected » areas.

In that context, Météo-France (the French national weather service), in close relationship with several French hydrology labs, has decided to launch a national collaborative project aiming at producing a 10-year reference database of Quantitative Precipitation Estimations (QPE). The objective is to make use optimally at any time of all available information (radars, hourly and daily rain gauges, satellite data, model freezing level heights, ...) to obtain the best surface precipitation estimation. Subsequently, the goal is to make the resulting data base, consisting of hourly, 1km² both QPE and associated estimation uncertainties, covering the entire French territory, a common reference for hydrologists, used for calibrating the model parameters, assessing the added value of input high space-time resolution in hydrological models,...

The multi-source QPE re-analysis requires automated process of radar data and combination of all available data sources, in particular combination of radar data with hourly and daily rain gauge network. First, methodology for automated identification and treatment of radar measurement artefacts (ground clutter, partial beam blocking, clear air echoes, anthropogenic targets, bright band...) were developed and tested. This initial step is particularly important when re-analysing old radar products, which were not corrected for many error sources. Secondly, methodologies for combination with daily and hourly rain gauges data were tested in order to optimally benefit from all information sources.
These methodologies and the first results will be presented here.